

Impact of pesticide use on farmers health condition: case control design

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With global populations growing, it is becoming increasingly impossible to ignore food and energy demands. Livestock and agricultural activities produce a large quantity of food. Though the use of agrochemicals has increased agricultural output, they have also been linked to a number of harmful clear adverse effects on human. chemical Pesticides poisonous compounds that negative effect on consumers. the study conducted a case-control was carried out to investigate variations among intact groups on an independent variable of interest. A random sampling approach was employed for 201 farmers. 098Farmers in the research group were exposed to pesticides, whereas farmers in the control group did not apply pesticides. The data were gathered using a survey (PHQ-15)-based on interviews conducted by the investigator. The current study was carried out in five districts (Al-Mashkhab, Al-Abbasiya, Al-hrea, Al-hera, and Al-qadisya). According to the study findings, total farmers' reactions to general physical condition among study group participants are substantially influenced, however, participant of control group show not effected. The negative health effect for farmers spray and exposed to pesticides shows nausea or vomiting, blurred vision, headache, bronchial sensitivity, skin irritation, and shortness of breath eye irritation. the current survey show the Insecticides are the most often used chemicals. The research indicated that pesticide use and exposure have an influence on human health and have a wide range of adverse health effects. According to the findings of the current study, it is critical to use personal protection equipment (PPE) while spraying. Also, undertake a comprehensive exam on farmers on a regular basis.

Keywords: Pesticide, farmers, health condition, chemical effect, global populations, Livestock, Research group, Headache.

INTRODUCTION

According to demographic projections for 2020, the population of Iraq is (41,150,174). The population of AL NAJAF AL Ashraf city is 4% of the entire Iraq people, with around 29% living in rural areas and 71% living in urban areas. (1) Every year, the world's population increases (Alhassany *et al.*, 2022) With a growing world population, the demand for food and energy becomes harder to ignore, and agriculture operations supply the majority of available food and energy. Farmers' health is one of the most important contemporary topics of debate in this field (Avtar *et al.*, 2019; Gil *et al.*, 2019).Farmers may be implicated in pesticide abuse when attempting to manage various pests since they frequently have little information regarding pest incidence and effective treatment strategies (Shrifzadeh *et al.*, 2018). Crop loss protection is as vital as providing nourishment, and agricultural pesticides played a critical role in avoiding such losses. However, the relevant nature of these pesticides is not without harmful (adverse) impacts on human health. Annually, around 2.4 billion kg of pesticides are used

worldwide, resulting in 250,000 to 370,000 human fatalities, the majority of which occur in underdeveloped nations (Mohammed *et al.*, 2018).

All employees who deal with or use chemical dangers have a direct impact on their physical well-being.(Yasir and Mansoor 2016; Khalifa and Lefta 2013)

In affluent nations, minimizing the use of synthetic pesticides in agriculture has become a serious problem. As evidenced by the current explosive rise in organic agriculture (Chèze, 2020) Negative adverse effect of pesticides utilization shows clear concern on human health including skin irritation, nervous system defect and respiratory (Tsimbiri *et al.*, 2015)

According the survey, the farmers reported acute pesticide-related concerns in the preceding year. The most prevalent symptoms were dizziness and headache, skin allergies, and eye burning. These are the most prevalent acute health concerns caused by toxic pesticide exposure that have been recorded elsewhere in Nepal (Lamichhane *et al.*, 2019).

MATERIALS AND METHODS

Study Design: The study was intended as a non-experimental study. The type of study a case-control study in which variants between groups on variable that to be study. retrospective investigations. Ex post facto these studies collect data "after the fact." to reach the aforementioned goals, research was conducted. The research will run from December 6, 2022, through March 19 of 2023.

Administrative Arrangements: (Faculty of Nursing - University of Kufa) the first agreement obtain. Furthermore, the Ministry of Planning/Central Council for Statistics has granted official approval to use the study questionnaire with some modifications. The farmer association give the permission to collect data. to fill out the form by each subject, and finally, after the researcher has clarified the intent of the study to them, the subject agreement is obtained from farmers; obtaining informed consent; and giving respect to the participants' confidentiality as well as rendering participation voluntary to answer the questionnaire.

The Setting of the Study: The current study was carried out in an agricultural field rural region in Iraq's Al Najaf Al-Ashraf Governorate. Al-Mashkahab, Al-Abbasya, Al-Qadsya, Al-Hrrya, and Al-Hera district are the agricultural land.

Population and Sample Size: population is a farmer in agricultural land in al-nagaf city. During search about the statistic the number of farmers work in agriculture field in al-najaf, result is unknown and very old statistic found since 2009, because a lot of farmers Exodus from the rural areas to the urban, in addition, agricultural lands have become residential areas, because of this reason the number of farmers is unknown.

The sample size calculated according to G power analysis program is a power analysis program for a variety of statistical tests tool to compute statistical power analyses for many different t tests. At a 0.05 threshold of significance, the power is 0.45, the sensitivity is 0.66, and the specificity is 0.88. The sample size resulted in (201) farmers being divided into two groups, (102) farmers being the exposure group who exposed to pesticide, and the remaining (99) farmers being the control group who did not exposure a pesticide.

Methods of Collection Data: The data was gathered through questionnaire-based conversations conducted by the researcher. Prior to the study, respondents received an explanation of the study and gave informed permission. The (phq-15) was used to assess the physical state. It comprises of 15 questions designed to assess farmers' well-being.

RESULTS

Table 1. Statistical Overview of Socio-Demographic Data Relating to Participants in the Study and Control Groups.

		Exposure group (N=102)		Control group (N=99)	
		Freq.	%	Freq.	%
Age (years)	<= 26	30	29.4	14	14.1
	27 - 35	34	33.3	33	33.3
	36 - 44	21	20.6	17	17.2
	45 - 53	9	8.8	13	13.1
	54+	8	7.8	22	22.2
	Mean	34.84		40.55	
	SD.	12.52		13.27	
Gender	Total	102	100.0	99	100.0
	Male	79	77.5	86	86.9
	Female	23	22.5	13	13.1
	Total	102	100.0	99	100.0
Marital state	Married	78	76.5	73	73.7
	Single	22	21.6	20	20.2
	Divorce	2	2.0	1	1.0
	Widower	0	0.0	5	5.1
	Total	102	100.0	99	100.0
Academic achievement	Not read or write	20	19.6	38	38.4
	Primary school	25	24.5	26	26.3
	Secondary school	17	16.7	25	25.3
	college	30	29.4	9	9.1
	Master's Degree	10	9.8	1	1.0
Living	Total	102	100.0	99	100.0
	Own house	55	53.9	67	67.7
	rent house	10	9.8	13	13.1
	agricultural house	37	36.3	19	19.2
	Total	102	100.0	99	100.0
Monthly income	It is enough	25	24.5	48	48.5
	Enough up to a point	44	43.1	27	27.3
	Not enough	33	32.4	24	24.2
	Total	102	100.0	99	100.0
Number of family members	<= 5	48	47.1	48	48.5
	6 - 9	41	40.2	35	35.4
	10 - 13	7	6.9	13	13.1
	14+	6	5.9	3	3.0
	Total	102	100.0	99	100.0
with Father and Mother family type	Nuclear	66	64.7	62	62.6
	Extended	36	35.3	37	37.4
	Total	102	100.0	99	100.0
	Years of work in the agricultural profession	<= 10	43	42.2	25
	11 - 20	35	34.3	39	39.4
	21 - 30	16	15.7	13	13.1
	31+	8	7.8	22	22.2
	Total	102	100.0	99	100.0
	Chronic diseases	No	70	68.6	84
Diabetic		6	5.9	4	4.0
Heart disease		6	5.9	2	2.0
Kidney disease		2	2.0	2	2.0
Tespiratory disease		13	12.7	5	5.1
Dermal disease		5	4.9	2	2.0
Total		102	100.0	99	100.0



This table show represents the socio-demographic statistical distribution for the study and control groups participants. The study result demonstrates that most of the study and control group participants (33.3%) in both are within (27 - 35) years old, the percentage of males is (77.5%) in study group and (86,9%) in control group. Also, the married participants constitute (76.5%) in the study group and (73.5%) in the control group.

In addition, most of the study group (29.4%) graduated from college, while (38.4%) of the control group do not read or write. The study also indicated that most of the members of the study group (53.9%) and control group (67.7%) live in their own house. Also, (43.1%) of study group are with monthly income enough up to a point, while (48.5%) of control group are with a enough monthly income. The percentage of family members consisting of (5) members or less is almost in both the study group (47.1%) and the control group (48.5%), also the majority of families are of the nuclear type in both the study group (64.7%) and the control group (62.6%).

The study also points that most of study group participants (42.2%) have worked in the agricultural profession for no more than (10) years while, (39.4%) of study group participants worked in the agricultural profession within (11 – 20) years. Finally, the majority of the participants of the study group (68.6%) and the control group (84.8%) do not suffer from chronic diseases.

Table 2. Mean differences in overall health between research and control groups of farmers involved in study.

Grouping	N	MS.	SD	Sig.
Study Group	102	1.68	0.26	0.0001*
Control Group	99	1.20	0.13	

* Significant at $P < 0.01$

In this Table shows that there are statistically significant differences in general health among the research participants' exposure and control groups of pesticide exposure and nonusers of pesticides at $P < 0.01$.

This table show represents the health condition of farmers statistical result the stomach pain in exposure group suffered a little and in control group don not suffered. Back pain for both spray and control groups show Suffer a little. In additional the blurred vision in exposure groups represent Suffer a little and in control group don not suffer. Headache in exposure group is clear during spray pesticides and show suffer a little compared with control groups don not suffered from headache. And during exposure to pesticides the bronchial sensitivity for farmers represents suffer a lot compared with control group show don not suffered from it. chest pain in both exposure and control group represents don't suffer from chest pain during exposure and without it. In additional in exposure group represent suffer a little from

nausea and vomiting during spray pesticides and don not suffered show in control group. In both exposure and control groups show feel bouts of fatigue by using pesticides and without use it. Rapid heart rate represent don not suffered in exposure group and control group.

In exposure group the shortness of breath represents suffer a little from it, compared with control group show don not suffer from it. The present study also shows ulcers in the mouth don not suffered in both exposure and control groups. In additional the exposure groups show suffered a little from constipation or diarrhea after exposure to pesticides and the control group show don not suffered from it.

The gas and indigestion show don not suffered in both study and control groups. The exposure groups show the redness and irritation on the skin suffered a little during spray and when contact directly with skin compared with study groups represent those don not suffered from it. Finally, the present study shows the exposure to pesticides represent redness and irritation in the eyes that suffer a little from it, compared with study group that represent don not suffered from redness and irritation in the eyes.

DISCUSSION

There was debate among the study groups regarding gauging farmers' overall well-being. The findings from this research show that pesticides had a significant effect on the subject group as opposed to the control group. Statistics show that the difference between spray and control groups is significant enough to classify pesticides as dangerous chemical compounds to farmer health.

The study demonstrates a statistically significant variance in objects (1, 3, 4, 5, 7, 10, 14, 15) (stomach pain, blurred vision, headache, nausea or vomiting, shortness of breath, bronchial sensitivity, irritation on the skin, irritation in the eyes) compared to the control group, which does not show any sign of suffering from these symptoms impacting well-being.

The influence on the study's category, on the other hand, comprises GIT and its causes (stomach discomfort, nausea or vomiting, constipation, or diarrhea). Aside from the effect on the eyes and the causes (blurred vision, redness, and eye pain). Also, the results on respiratory and the effect on (bronchial sensitivity, and shortness of breath) were compared to a reference group that did not exist or was not harmed by pesticides. The research was done by (Ganaie *et al.*, 2022), and the findings revealed that the most common symptoms of medical conditions among respondents were related to eye sickness (blurred vision, irritation), followed by illnesses such as nervous system conditions (headache, dizziness), and skin diseases.

Furthermore, the study concluded that human exposure to pesticides has a variety of negative consequences depending on the chemical and period of exposure. Lacrimation, nausea, diarrhea, respiratory depression, and shortness of breath are



Table 3. shows the overall physical condition of farmers in the Study and Control Groups.

Items	Levels	Study Group (N=102)				Control Group (N=99)			
		Freq.	%	MS	Asses.	Freq.	%	MS	Asses.
Did you feel pain in the stomach?	I don't suffer	49	48.0	1.78	Suffer a little	95	95.9	1.08	Don't Suffer
	I suffer a little	50	49.1			4	4.1		
	I suffer a lot	3	2.9			0	0.0		
	Total	102	100.0			99	100.0		
Did you feel pain in the back?	I don't suffer	29	28.4	1.81	Suffer a little	22	22.2	1.94	Suffer a little
	I suffer a little	63	61.8			61	61.6		
	I suffer a lot	10	9.8			16	16.2		
	Total	102	100.0			99	100.0		
Have you suffered from blurred vision?	I don't suffer	43	42.2	1.70	Suffer a little	91	91.9	1.09	Don't Suffer
	I suffer a little	47	46.1			7	7.1		
	I suffer a lot	12	11.8			1	1.0		
	Total	102	100.0			99	100.0		
Did you feel pain in the head?	I don't suffer	16	15.7	2.11	Suffer a little	93	93.9	1.06	Don't Suffer
	I suffer a little	59	57.8			6	6.1		
	I suffer a lot	27	26.5			0	0.0		
	Total	102	100.0			99	100.0		
Did you feel bronchial sensitivity?	I don't suffer	3	2.9	2.42	Suffer a lot	99	100.0	1.00	Don't Suffer
	I suffer a little	53	52.0			0	0.0		
	I suffer a lot	46	45.1			0	0.0		
	Total	102	100.0			99	100.0		
Have you had chest pain?	I don't suffer	84	82.4	1.20	Don't Suffer	71	71.7	1.32	Don't Suffer
	I suffer a little	16	15.7			24	24.2		
	I suffer a lot	2	2.0			4	4.0		
	Total	102	100.0			99	100.0		
Did you feel nausea or vomiting?	I don't suffer	44	43.2	1.70	Suffer a little	95	96.0	1.04	Don't Suffer
	I suffer a little	54	52.9			4	4.0		
	I suffer a lot	4	3.9			0	0.0		
	Total	102	100.0			99	100.0		
Did you feel bouts of fatigue?	I don't suffer	24	23.5	1.88	Suffer a little	24	24.2	2.03	Suffer a little
	I suffer a little	66	64.7			48	48.5		
	I suffer a lot	12	11.8			27	27.3		
	Total	102	100.0			99	100.0		
Did you feel the rapid heart rate?	I don't suffer	71	69.6	1.38	Don't Suffer	91	91.9	1.11	Don't Suffer
	I suffer a little	23	22.5			5	5.1		
	I suffer a lot	8	7.8			3	3.0		
	Total	102	100.0			99	100.0		
Have you suffered from shortness of breath?	I don't suffer	16	15.7	2.24	Suffer a little	93	93.9	1.06	Don't Suffer
	I suffer a little	46	45.1			6	6.1		
	I suffer a lot	40	39.2			0	0.0		
	Total	102	100.0			99	100.0		
Have you had ulcers in the mouth?	I don't suffer	78	76.5	1.25	Don't Suffer	90	90.9	1.09	Don't Suffer
	I suffer a little	23	22.5			9	9.1		
	I suffer a lot	1	1.0			0	0.0		
	Total	102	100.0			99	100.0		
Did you suffer from constipation or diarrhea?	I don't suffer	36	35.3	1.81	Suffer a little	93	93.9	1.07	Don't Suffer
	I suffer a little	64	62.7			5	5.1		
	I suffer a lot	2	2.0			1	1.0		
	Total	102	100.0			99	100.0		
felt gas and indigestion?	I don't suffer	72	70.6	1.30	Don't Suffer	91	91.9	1.10	Don't Suffer
	I suffer a little	29	28.4			6	6.1		
	I suffer a lot	1	1.0			2	2.0		
	Total	102	100.0			99	100.0		
feel redness and irritation on the skin?	I don't suffer	28	27.5	1.94	Suffer a little	99	100.0	1.00	Don't Suffer
	I suffer a little	52	51.0			0	0.0		
	I suffer a lot	22	21.6			0	0.0		
	Total	102	100.0			99	100.0		
feel redness and irritation in the eyes?	I don't suffer	30	29.4	1.95	Suffer a little	99	100.0	1.00	Don't Suffer
	I suffer a little	47	46.1			0	0.0		
	I suffer a lot	25	24.5			0	0.0		
	Total	102	100.0			99	100.0		

MS: Mean of Scores; Don't Suffer: MS = 1-1.66; Suffer a little: MS = 1.67-2.33; Suffer a lot: MS 2.34-3.

the most prevalent symptoms of exposure (Dahiri *et al.*, 2021).

The study was done by (Desa *et al.*, 2023), and the study resulted in the majority of participants suffering from

bronchial sensitivity during spray and contact with pesticides. This study's findings and consistency with current findings reveal a comparison of health complaints stated over the previous three months by conventional (n = 243) and organic



(n = 235) farmers. And this leads in a substantial difference between groups, as well as differences in health concerns, particularly in pesticide-using farmers, such as (skin rash, blurred vision, shortness of breath, nausea) and health symptoms linked with pesticide-using conventional farmers (Nankongnab *et al.*, 2020).

Based on study (Upadhayay *et al.*, 2020), the health concerns connected with a pesticide application range from immediate (headache, dizziness, skin, and eye irritation) to chronic (cancer, thyroid, asthma, diabetes).

Furthermore, the findings of the research accord with those of (Kori *et al.*, 2018), who observed unfavorable health implications among farm laborers. The most prevalent symptoms were muscle pain (51.6%), headache (56.5%), skin disease (19%), impaired vision (35.5%), tremors (23%), stress (24.2%), dizziness (66.1%), and heart disease (16.9%).

Additionally, the outcomes are consistent with a recent study (Moda *et al.*, 2022), which revealed that pesticide poisoning causes headaches (56%), dizziness (56%), and skin irritation (53%). Furthermore, many of the expressed direct health issues include nausea, skin and eye irritations, headache, vomiting, and overall discomfort after spraying. Other chronic non-reported health problems/deaths have also been linked to pesticide usage (dealing with and storage) (Wondimu *et al.*, 2022).

In another research, 38.76% of vegetable farmers reported headaches, 33.55% reported skin irritation or rashes on the body, and 31.27% reported skin irritation or rashes on the body. Farmers experienced eye discomfort, blurred vision, and nausea in 28.33%, 24.75%, and 17.26% of cases, respectively (Mehmood *et al.*, 2021). And with regard to the items (2, 8) and result Suffer a little and during compare between items both groups are same result so this effect may to the nature of work in agricultural fields requires effort and tiring physical work.

A workout is necessary during work as a farmer and in the field of agriculture (Omoniyi *et al.*, 2020).

Agricultural chores commonly involve ergonomic risk factors for farmers' back discomfort (Thamsuwan *et al.*, 2020).

In Thailand, the study found that farmers working in agricultural areas experienced moderate pain (58.78%) and severe discomfort (8.65%) (Prommawai *et al.*, 2019). This result of fatigue and back pain return to natural hard physical effort of agricultural work.

Conclusion: Effect pesticides on farmers health clear and a negative health effect result by exposure to pesticides including (skin irritation, eye irritation, bronchial sensitivity, headache, blurred vision). Farmers who were exposed to or sprayed with pesticides had a clear effect on them, when these pesticides are sprayed by the farmer, the farmer inhales them or is exposed to them through contact with the skin and even the eyes, so their effect is clear on the health condition, so the

pesticides have a negative health effect on health through exposure for it.

Recommendations: Future research should be carried out to establish the effect of pesticide use on farmers' mental well-being. Other studies should be undertaken to measure farmers' pesticide knowledge and attitudes.

Nursing Implication: Nurses play an important part in many aspects of life, shedding light on numerous problems and finding answers to these problems that are relevant to human health. And the nurse as a health scope promotes public health and offers health monitoring, promotion, and prevention for farmers' health. Pesticide impact on farmers is being tracked and reduced. Nurse managers, policymakers, and teachers must work together to broaden their reach in teaching the role of the environment and social aspects of health through evidence-based care models, as well as actively contributing to the achievement of the Sustainable Development Goals by encouraging "global" thinking. All procedures were in according to allowance of farmers and local health regulations.

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